4.0 EFFLUENT CONTROL SYSTEMS

This section describes the effluent control systems that will be used at the Nichols Ranch ISR Project. The potential effluents include radon, radioactive particulates in air, and radionuclides in liquid streams.

4.1 GASEOUS AND AIRBORNE PARTICULATES

The major airborne radioactive effluents include radon gas and radioactive particulates. To the extent practical, the facility ventilation systems for control of these effluents will be designed to accomplish the following:

- Provide for general area and local ventilation where concentrations of natural uranium and daughters, and radon or daughters may be present in excess of 25% of the values given in Table 1 of Appendix B to 10 CFR 20.
- Exhausted air will not enter air intakes that service other facility areas.

4.1.1 Radon

The principal gaseous radiological effluent is radon released from the circulating leach solution and/or in the elution and precipitation circuit. The buildup of radon in buildings will be controlled by general area and local ventilation systems.

4.1.1.1 General Area Ventilation

General ventilation of work areas in process buildings may be maintained by a forced air ventilation system. The preliminary general area ventilation system for the Nichols Ranch CPP will be designed to force air to circulate through the process areas with four, ten thousand (10,000) cfm fans. The ventilation system will draw fresh air into the building and exhaust outside the building resulting in an air exchange ratio of approximately 2.7 air exchanges per hour. The forced air system will be used when the buildings are normally closed due to weather or other factors. During favorable weather conditions, open doorways and convection vents will assist in providing satisfactory work area ventilation.

Preliminary general area ventilation design work for the Hank satellite includes the installation of two fans with a design capacity of 10,000 cfm per each fan. The two fans will be located so that one fan is on a separate half of the Hank satellite processing building. The air exchange rate for the two fans is approximately 3.1 air exchanges per hour. Like the Nichols Ranch CPP, during favorable weather conditions, open doorways and convection vents will assist in providing ventilation to the general work area. The Hank satellite processing building will also be heated during the winter months to maintain comfortable temperatures within the processing building.

Figures 4-1 and 4-2 (see map pockets) show the preliminary ventilation system for the Nichols Ranch CPP and the Hank Unit satellite.

4.1.1.2 Local Ventilation

A system independent of the general area ventilation will provide local ventilation for process vessels where significant concentration of radon could reasonably be expected to be released. The system will consist of ducting or piping near the expected point of release for the respective process vessel. Fans will collect gases through the ducting or piping and exhaust outdoors. The design will include considerations of redundancy or compensation. Airflow through openings in the vessels will be from the process area into the vessel and into the ventilation system, thus controlling any releases that occur inside the vessel. Separate and independent local ventilation systems may be used temporarily as needed for functional areas or nonroutine activities.

4.1.2 Particulate

The principal particulate radiological effluent is uranium and daughters released from the drying and packaging of yellowcake. An independent ventilation and filtration system is installed as a part of this operation. A description of the effluent controls of vacuum drying and packaging system are summarized as:

- The drying chamber operates at negative pressure.
- A bag house is situated above the drying chamber. It provides for filtration of air and vapor from the drying chamber. The dry solids on the filter surfaces are discharged back to the drying chamber. The bag house is maintained under negative pressure by the vacuum system.
- A condenser is located downstream of the bag house. Dust passing through the bag filters is wetted and entrained in the condensing moisture within this unit. The gases are moved through the condenser by the vacuum system.
- The vacuum system is a water sealed unit. It provides a negative pressure on the entire system during drying and packaging. The water seal captures entrained particulate remaining in the gas stream.

- Ventilation is provided by the vacuum system when yellowcake is transferred from the drying chamber for packaging.
- The low intermittent air flow exiting the vacuum system precludes sampling of this effluent.
- The system is instrumented to shut itself down for malfunction or failure of the vacuum system. The system will alarm if there is an indication that the emission controls are not performing within specifications. Operating procedures will provide for return of the system to service upon correction of the malfunction or failure.

Instrumentation provides an audible and/or visual alarm if the vacuum level is outside specifications; the operation of this system is monitored during drying and packaging operations. In the event the instrumentation system fails, the operator will document checks of the vacuum every four hours. Additionally, during routine operations, the air pressure differential gauges for other emission control equipment is observed and documented at least once per shift during dryer operations.

The vacuum system is proven technology which is being used successfully at several uranium recovery facilities where uranium oxide is being produced.

4.2 LIQUIDS AND SOLIDS

This section provides description of disposal methods for the major liquid effluents and solid wastes at the Nichols Ranch ISR Project.

4.2.1 Liquid Effluents

Liquid effluents are expected to be generated from well development water, pumping test water, process bleed, process solutions, wash-down water, and restoration water.

The water generated during well development and pumping tests is expected to satisfy WDEQ-WDQ Class III (Livestock) standards at a minimum and has minimal potential radiological impact on soils or surface water. No alternate handling or disposal method is required allowing water to be pumped onto the ground.

The process bleed and wash down water will be transferred to a deep disposal well. This deep disposal well will be equivalent in design and depth to existing deep disposal wells at similar ISR uranium recovery sites. This deep disposal well will be permitted through the WDEQ and operated according to permit requirements.

The restoration water will be treated by reverse osmosis or other purification technology. The treated restoration water will be re-injected into the production area undergoing restoration with the restoration water bleed transferred to the deep disposal well.

4.2.2 Solid Wastes

Solid wastes will normally consist of spent resin, empty packaging, miscellaneous pipes and fittings, tank sediments, and domestic trash. These materials will be classified as contaminated or noncontaminated based on their radiological characteristics.

4.2.2.1 Noncontaminated solid waste

Noncontaminated solid waste is waste which is not contaminated with radioactive material or which can be decontaminated and reclassified as noncontaminated waste. This type of waste may include trash, piping, valves, instrumentation, equipment and any other items which are not contaminated or which may be successfully decontaminated. Noncontaminated solid waste will be collected on the site in designated areas and disposed of in the nearest permitted sanitary landfill.

It is estimated that the site will produce approximately 700 to 1,000 cubic yards of noncontaminated solid waste per year. This estimate is based on the waste generation rates of similar in situ uranium recovery facilities.

4.2.2.2 Contaminated solid waste

Contaminated solid waste consists of solid waste contaminated with radioactive material that cannot be decontaminated. This waste will be classified as 11.e(2) byproduct material. This byproduct material will consist of filters, personal protective equipment, spent resin, piping, etc. It is estimated that the site will produce approximately 60 to 90 cubic yards of 11.e(2) byproduct material as waste per year. This estimate is based on the waste generation rates of similar ISR uranium recovery facilities. These materials will be temporarily stored on site and periodically transported for disposal.

Contaminated soils may also be temporarily stored on site and periodically transported for disposal.

Uranerz will establish an agreement(s) for disposal of 11.e(2) byproduct material and contaminated soils in a licensed waste disposal site or licensed mill tailings facility. Uranerz will notify NRC within seven days if any disposal agreement is terminated and will submit a new agreement to NRC staff for approval within 90 days of expiration or termination.

4.3 CONTAMINATED EQUIPMENT

Surface contamination surveys will be conducted of potentially contaminated equipment and materials before they are released to unrestricted areas. The applicable surface contamination limits are provided by USNRC, *Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material*, Division of Fuel Cycle and Material Safety, April 1993. A comprehensive radiation survey will be made in conformance with these guidelines, which establishes that contamination is within the limits specified within the referenced guidelines and is as low as is reasonably achievable before release of the equipment or material for unrestricted use.

If contamination above these limits is detected, the equipment or material will be decontaminated until the limits are satisfied, or the item will not be released to unrestricted use.

Radioactivity on surfaces will not be covered by paint, plating, or other covering unless contamination levels, as determined by a survey and documented, are below the aforementioned limits before application of the covering. A reasonable effort will be made to minimize the contamination before use of any covering.

The radioactivity of the interior surfaces of pipes, drain lines, or duct work will be determined by making measurements at all traps and other appropriate access points, provided that contamination at these locations is likely to be representative of contamination on the interior of the pipes, drain lines, or duct work.

4.4 SYSTEM FAILURES

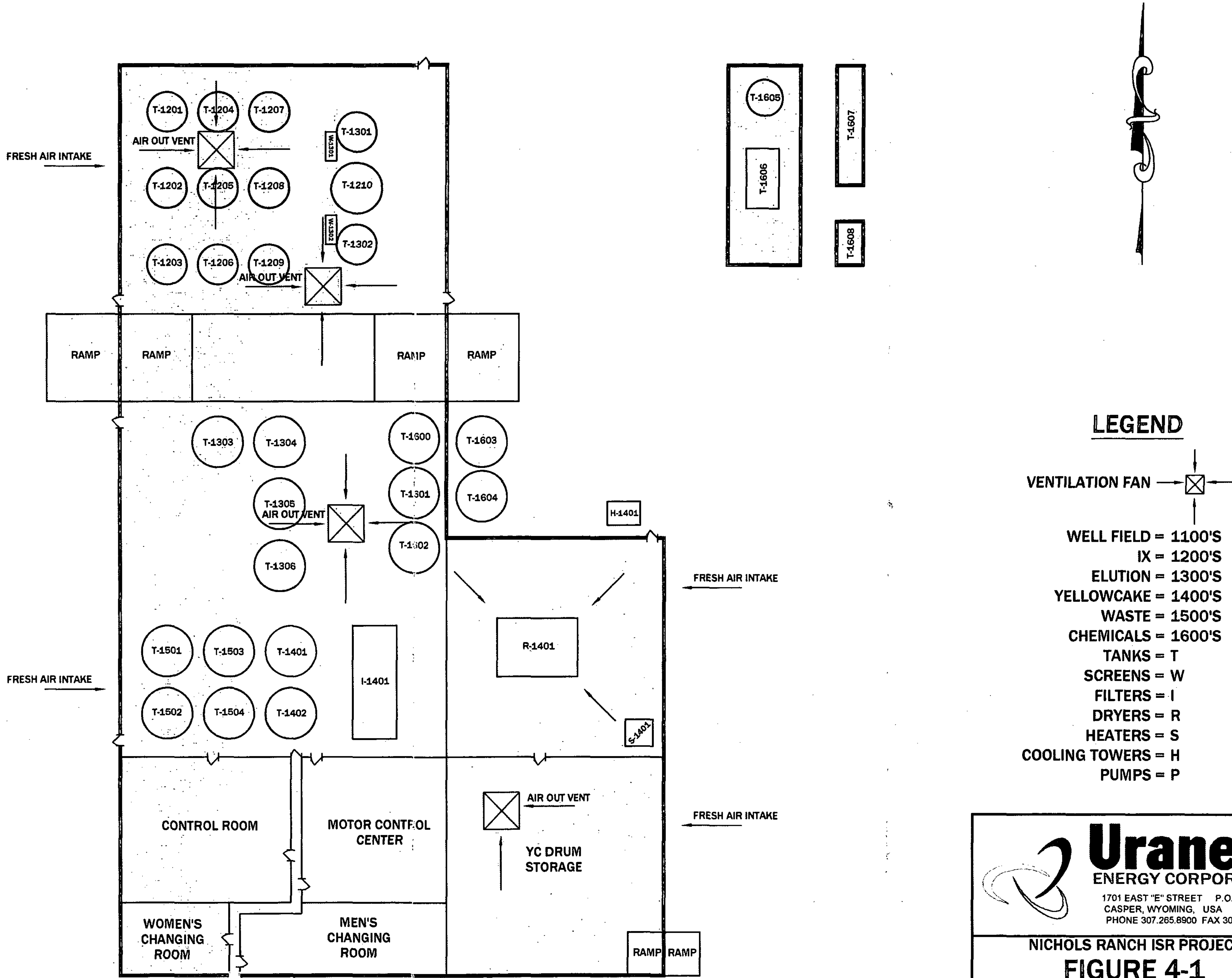
In the event that a spill occurs in the wellfield or process plants, measures will be taken to safely and quickly contain the spill and mitigate the impacts of any released material. Proper notification of plant and corporate management will be made along with properly contacting the NRC and State.

Spills are likely to occur from leaking pipelines and fittings. If a pipeline leak or spill occurs in the plants, the spill or leak will be contained within the building with all spilled material collected in the plant sump. This material will either be pumped back into the process or sent to the deep disposal well.

Wellfield spills will be contained as soon as possible. The area of the spill will be surveyed to identify any contaminated areas and then cleaned up and removed for disposal according to NRC and State regulations.

If any process vessels or tanks that contain or have contained radioactive materials have to be entered for any reason such as cleaning, inspection, or repairs, a radiation work permit (RWP) will be issued detailing the requirements for special air sampling, protective equipment, and increased exposure surveillance.

To notify operating personnel of potential issues with process and wellfield operations, instrumentation such as flow meters and pressure indicators will be used. If any process condition falls out of the normal operating range, audible and visual alarms will sound notifying employees of potential plant problems. The alarm notification will aid in reducing the severity of any potential spills that might occur.



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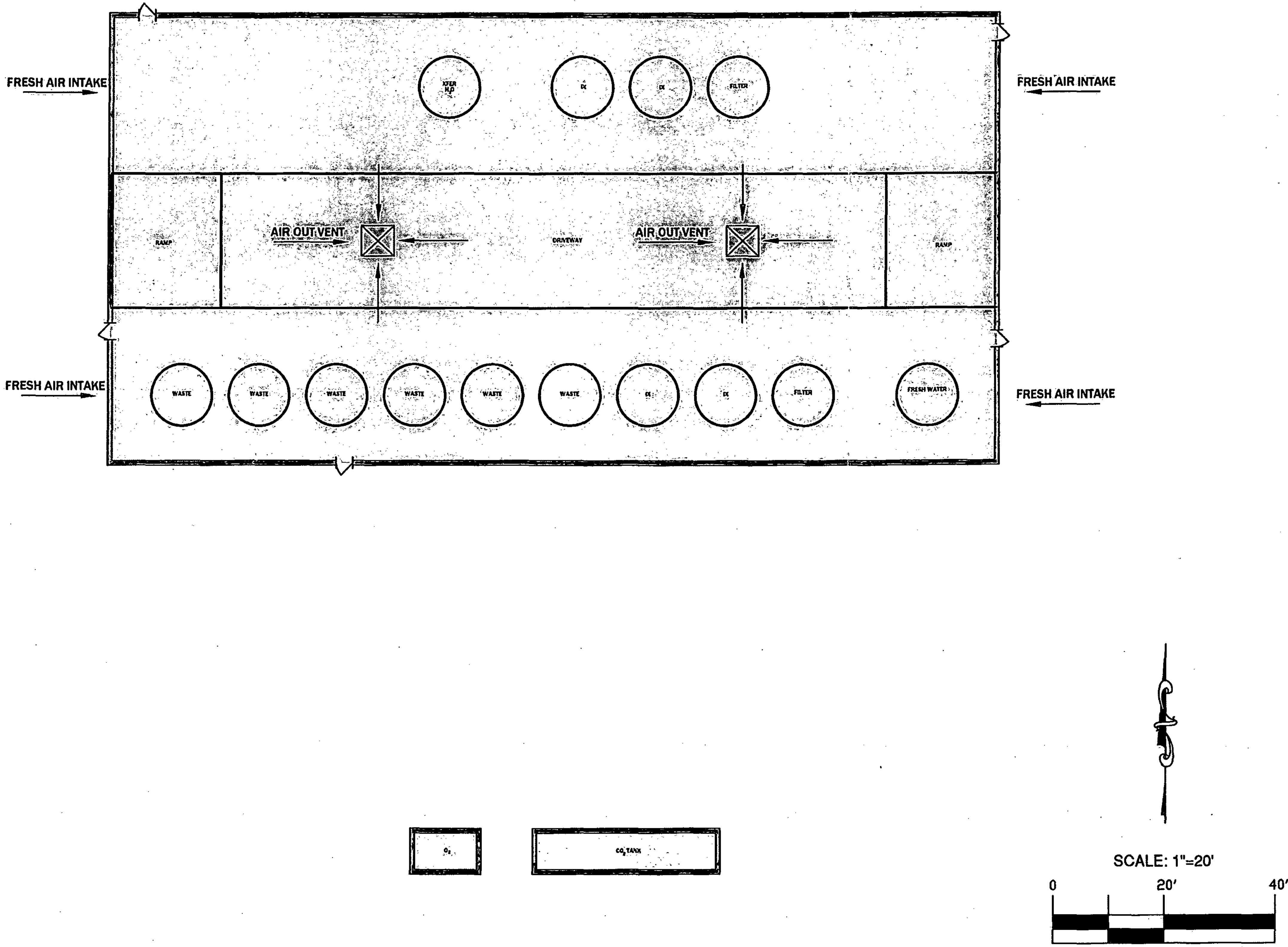
NICHOLS RANCH ISR PROJECT

FIGURE 4-1

PRELIMINARY NICHOLS RANCH UNIT PROCESS VENTILATION DIAGRAM

By: S.M.F.	Date: 01-05-2009
Contour Interval: N/A	Revision Date:
Scale: 1"=30'	Datum: NAD27 UTM13



LEGEND

VENTILATION FAN

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NICHOLS RANCH ISR PROJECT

FIGURE 4-2
PRELIMINARY HANK SATELLITE PLANT VENTILATION FLOW DIAGRAM

By: S.M.F.	Date: 2/22/2008
Contour Interval:	Revision Date:
Scale: 1"=20'	Dwg: 4-2 AIR FLOW